

LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES



**OFFICE OF FISHERIES
INLAND FISHERIES SECTION**

PART VI -B

WATERBODY MANAGEMENT PLAN SERIES

PEARL RIVER BASIN

**WATERBODY EVALUATION &
RECOMMENDATIONS**

CHRONOLOGY

DOCUMENT SCHEDULED TO BE UPDATED ANNUALLY

December 2012 - Prepared by
Tim Ruth Biologist Manager, District 8

August 2013 – Updated by
Tim Ruth Biologist Manager, District 8

December 2014 – Updated By:
Gary Vitrano, Biologist Manager, District 8

August 2015 – Updated By:
Gary Vitrano, Biologist Manager, District 8

The remainder of this page intentionally left blank.

TABLE OF CONTENTS

WATERBODY EVALUATION	4
STRATEGY STATEMENT	4
<i>Recreational</i>	<i>4</i>
<i>Commercial</i>	<i>4</i>
<i>Species of Special Concern</i>	<i>4</i>
EXISTING HARVEST REGULATIONS	4
<i>Recreational Fishing Regulations</i>	<i>4</i>
<i>Commercial Fishing Regulations</i>	<i>4</i>
<i>Species of Special Concern</i>	<i>4</i>
SPECIES EVALUATION	4
<i>Recreational</i>	<i>4</i>
<i>Commercial</i>	<i>17</i>
<i>Species of Special Concern</i>	<i>17</i>
HABITAT EVALUATION	17
<i>Aquatic Vegetation</i>	<i>17</i>
<i>Artificial Structure</i>	<i>18</i>
CONDITION IMBALANCE / PROBLEM	18
CORRECTIVE ACTION NEEDED	18
RECOMMENDATIONS	19
APPENDIX I	21
APPENDIX II	23

WATERBODY EVALUATION

STRATEGY STATEMENT

Recreational

Sportfish species such as largemouth bass are managed to maintain a sustainable population while providing anglers the opportunity to catch or harvest numbers of fish to maintain angler interest and efforts.

Commercial

Commercial species are managed with statewide regulations to provide a maximum sustainable yield that does not contribute to declines in future population strength.

Species of Special Concern

Species of special concern are managed to protect the current population and to provide for a sustainable population.

EXISTING HARVEST REGULATIONS

Recreational Fishing Regulations

Statewide regulations are in effect for all fish species and may be viewed at the link below:
<http://www.wlf.louisiana.gov/fishing/regulations>

Commercial Fishing Regulations

Statewide regulations are in effect for all species. Commercial fishing regulations may be viewed at the link below:
<http://www.wlf.louisiana.gov/fishing/regulations>

Louisiana Revised Statute RS 56:404 prohibits the use of seines, nets, or webbing in the Bogue Chitto River; logging and hand grabbing of fish in the Bogue Chitto River is also prohibited.

Species of Special Concern

Louisiana prohibited the take of all sturgeon in 1991. Critical habitat was established in the PRB for the Gulf sturgeon in 2003. It is also illegal in Louisiana to possess a threatened or endangered species.

SPECIES EVALUATION

Recreational

Largemouth Bass

Largemouth bass are targeted for evaluation since they are a species indicative of the overall fish population due to their high position in the food chain. Electrofishing sampling is the best indicator of largemouth bass abundance and size distribution, with the exception of large fish.

Largemouth bass catch per unit of effort and size structure

Largemouth bass (LMB) occur throughout the PRB. However, the species is most abundant and most targeted by anglers in the lower portion of the river. The frequency and locations of LDWF's electrofishing samples in the basin have not been consistent over time and do not reflect a coordinated initiative to study the LMB population. Therefore, the following evaluation focuses on fall samples collected by LDWF in the Middle Pearl / West Middle Pearl River (LDEQ water body code 090207).

Electrofishing for LMB is conducted at 4 stations in the lower Pearl River system ([Appendix D](#)). This area is tidally influenced and salinities ranged from 0.1 parts per thousand (ppt) to 5.7 ppt during sampling efforts. Increased water levels and flow rates associated with spring flood pulses may adversely affect the efficiency of electrofishing efforts. Therefore, only data from fall electrofishing samples are considered in data analysis. Catch per unit of effort (CPUE) analyses by length category indicates a population dominated by individuals < 12 inches TL (Figure 1). These results appear to corroborate reports from anglers who have noted catches of large numbers of small fish. Mean total CPUE for years 1989 through 2009 may indicate a population decline and subsequent rebound following Hurricane Katrina (Figure 2).

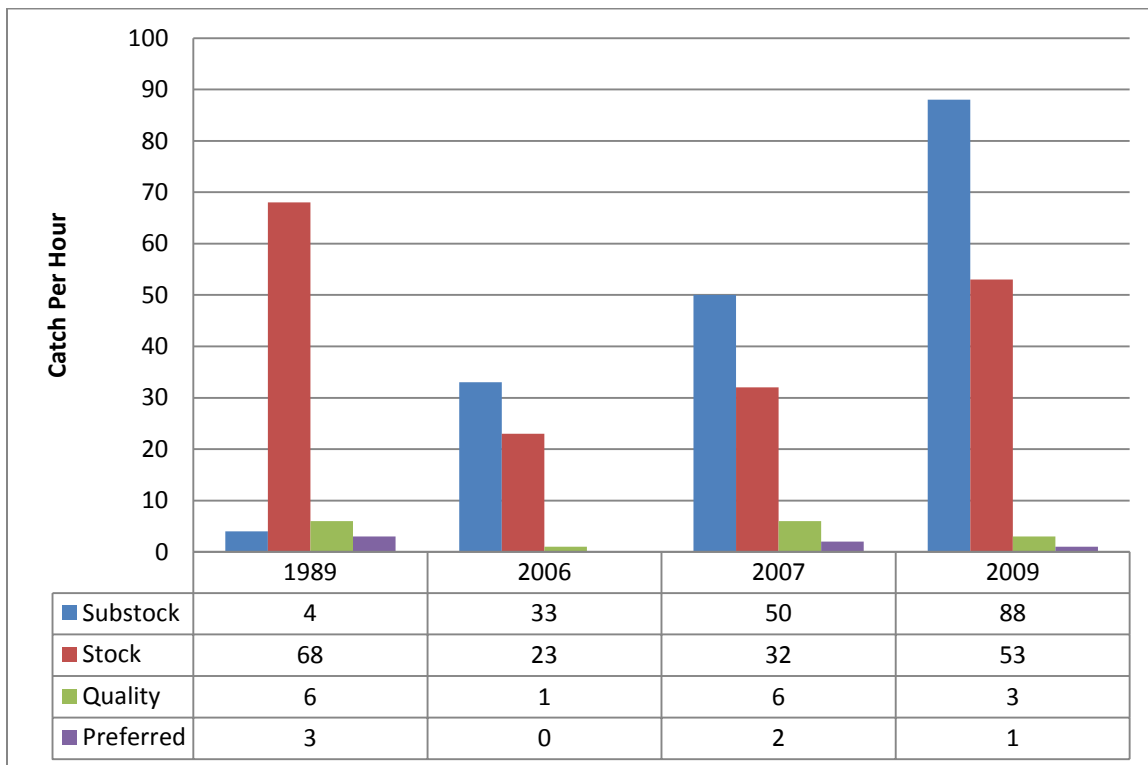


Figure 1. The CPUE of substock- (< 8 inches), stock- (8-12 inches), quality- (12 - 15 inches), and preferred-size (15 - 20 inches) largemouth bass from the Middle and West Middle Pearl River, LA, collected during fall electrofishing efforts in 1989, 2006, 2007 and 2009.

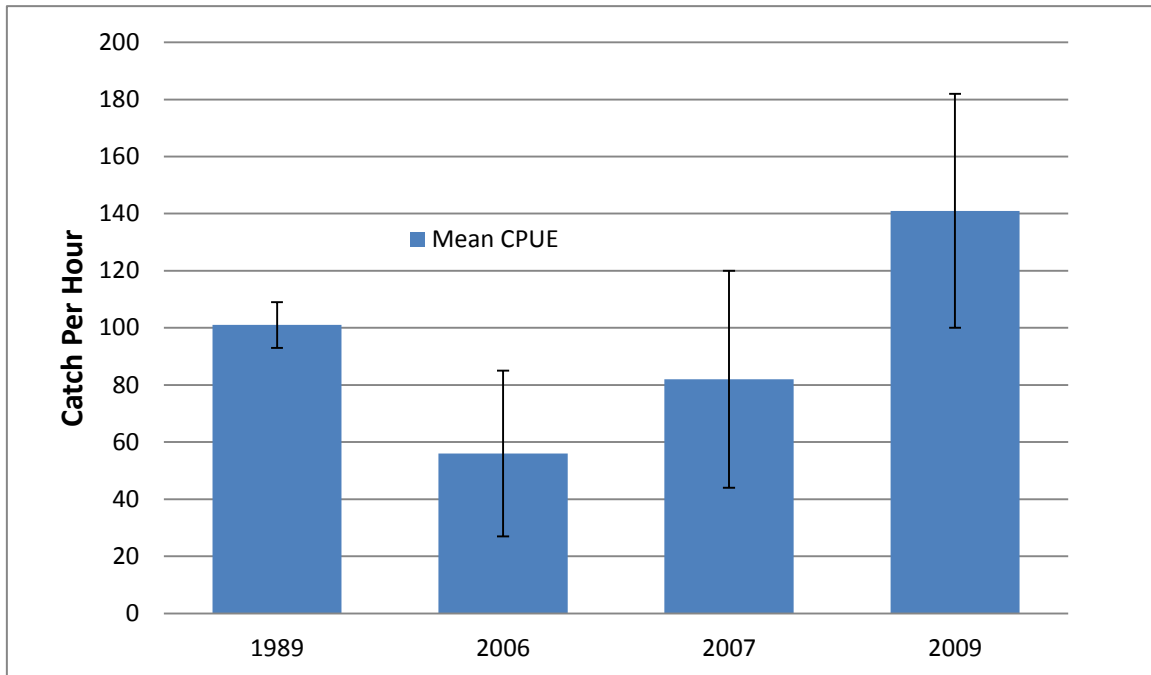


Figure 2. Mean total catch-per-unit-effort (+ SE) for largemouth bass collected in fall electrofishing samples for the Middle and West Middle Pearl River, LA, for the years 1989, 2006, 2007 and 2009.

Proportional stock density (PSD) and relative stock density (RSD) are indices used to numerically describe length-frequency data. Proportional stock density compares the number of fish of quality size (greater than 12 inches for largemouth bass) to the number of bass of stock-size (≥ 8 inches in length). The PSD is expressed as a percent. A fish population with a high PSD consists mainly of larger individuals, whereas a population with a low PSD consists mainly of smaller fish.

$$\text{PSD} = \frac{\text{Number of bass} \geq 12 \text{ inches}}{\text{Number of bass} \geq 8 \text{ inches}} \times 100$$

Relative stock density of preferred-size fish (RSD_p) is the proportion of largemouth bass in a stock (fish over 8 inches) that are 15 inches or longer.

$$\text{RSD}_p = \frac{\text{Number of bass} > 15 \text{ inches}}{\text{Number of bass} > 8 \text{ inches}} \times 100$$

Ideal PSD and RSD values for largemouth bass range from 40-70 and 10-40, respectively. Figure 4 below indicates that PSD and RSD_p values for the Pearl River are very low for all years sampled and likely due to the small numbers of largemouth bass in the data sets.

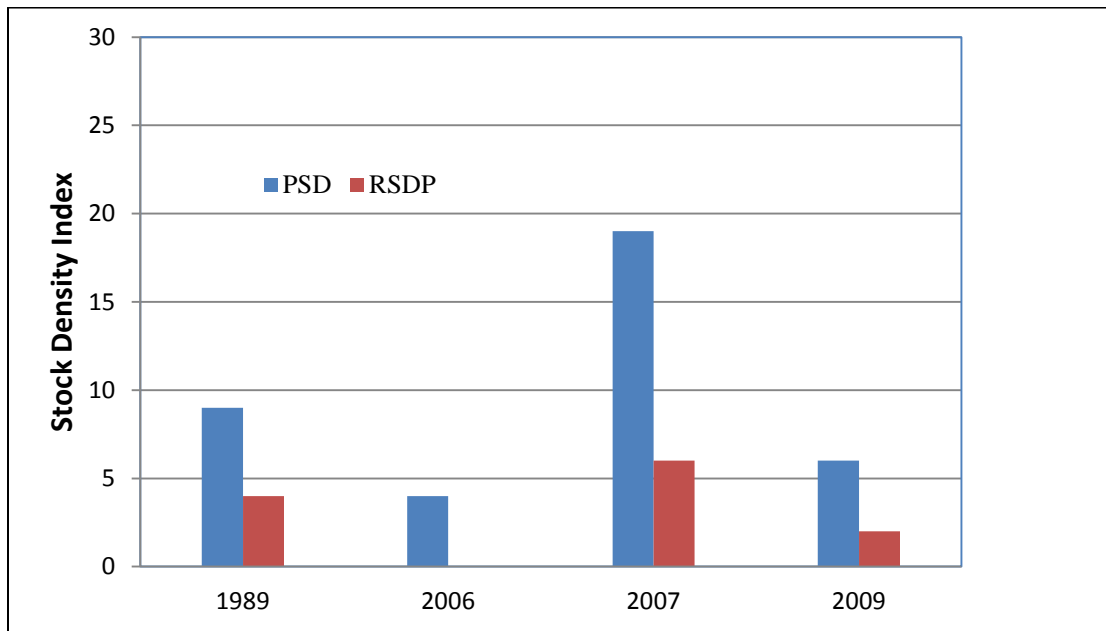


Figure 3. The PSD and RSD_P for largemouth bass collected in fall electrofishing samples from the Pearl River, LA for the years 1989, 2006, 2007 and 2009.

Forage

Forage availability can be measured indirectly by calculating fish body condition or relative weight. Relative weight (W_r) is a measure of fish “plumpness” and is the ratio of the fish weight to that of a determined standard weight for healthy fish. Largemouth bass W_r below 80 may indicate a potential problem with forage availability. Relative weights that are near or above 100 indicate a healthy bass population. Mean relative weight for stock size Pearl River bass ranged from 89.4 to 101.7. LMB of stock-size length category are in good condition and forage does not appear to be a limiting factor.

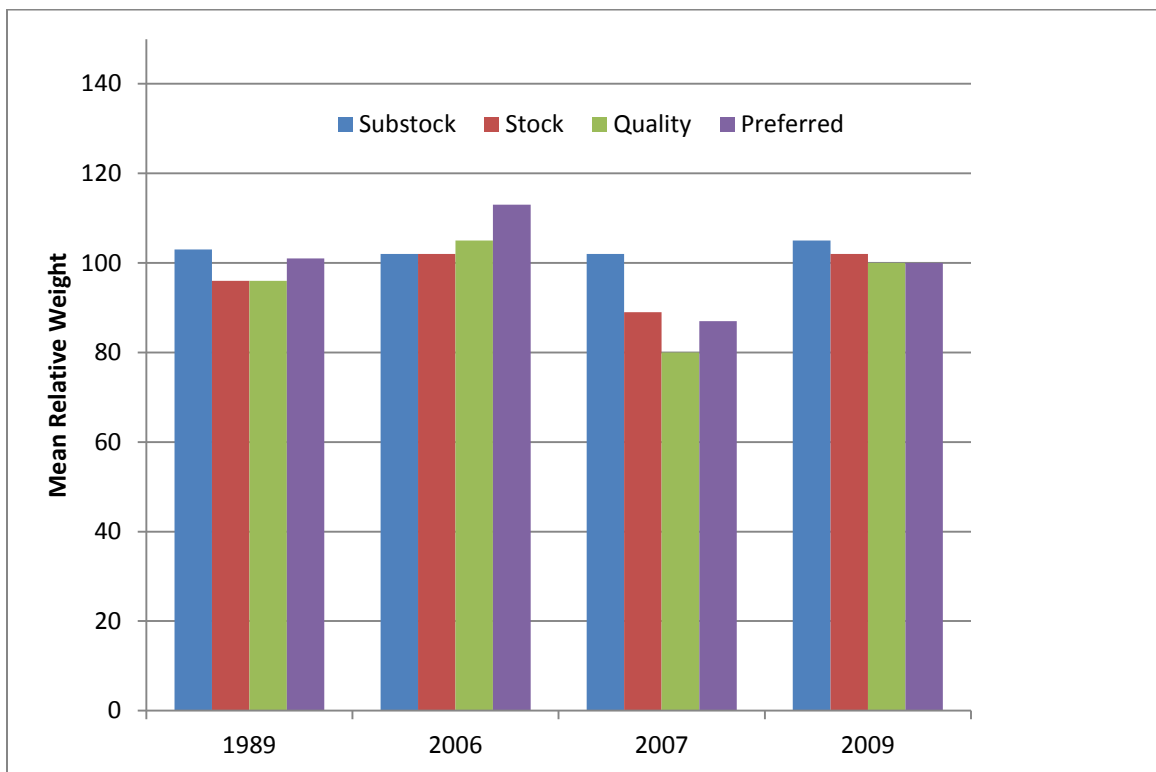


Figure 4. Mean relative weights for the various size classes of largemouth bass collected from the Pearl River for the years 1989, 2006, 2007 and 2009.

Crappie

Electrofishing is not the most efficient sampling method for crappie. Lead nets are often used to determine the abundance and size structure of crappie populations. We have experimented with the placement and method of fishing lead nets to monitor the crappie population in the PRB. However, no sound method for crappie sampling within the river has been determined.

Pearl River Fish Kill Post Incident Monitoring

The Louisiana Department of Wildlife and Fisheries (LDWF) completed a three year fish and mussel monitoring project between 2012 and 2014 in the Pearl River and associated waters. The project's primary objective was to monitor the recovery of native species following the August 2011 Pearl River Fish and Mussel Kill (PRFK) and to identify management actions, if necessary, to aid in the recovery of fish and mussel communities ([APPENDIX II](#)).

Fish Assemblage Sampling

Fifteen thousand, eight hundred and thirty four individual fish representing sixty-one species from seventeen families were collected in all samples from 2012 to 2014 (Table 1). Members of the family Cyprinidae were the most abundant. Fourteen species of Cyprinidae accounted for 76% of total individuals collected. Two species of Cyprinidae accounted for 61% of the total individuals collected, the blacktail shiner and silvery minnow. Members of the family Ictaluridae (catfishes) were the second most represented family in the samples comprising 15% of the total, followed by members of the family Centrarchidae with 6% of

the total. Shannon-Weiner H', number of individuals and species richness per site were similar throughout the sample period (Table 2). Complete analysis of fish assemblage is contained in the Pearl River Fish Kill Post Incident Monitoring Report 2012 - 2014 (Appendix II).

Table 1. Species collected during the PRFK post incident monitoring from 2012-2014 in the Pearl River basin.

FAMILY	SCIENTIFIC NAME	COMMON NAME	TOTAL
Achiridae	<i>Amia calva</i>	Bowfin , Choupique	1
Anguillidae	<i>Anguilla rostrata</i>	American eel	2
Achiridae	<i>Trinectes maculates</i>	Hogchoker	52
Atherinopsidae	<i>Labidesthes sicculus</i>	Brook silverside	6
	<i>Menidia beryllina</i>	Inland silverside	1
Catostomidae	<i>Carpionodes carpio</i>	River carpsucker	26
	<i>Cycleptus elongates</i>	Blue sucker	3
	<i>Hypentelium nigricans</i>	Northern hogsucker	4
	<i>Ictiobus bubalus</i>	Smallmouth buffalo	43
	<i>Ictiobus cyprinellus</i>	Bigmouth buffalo	12
	<i>Ictiobus niger</i>	Black buffalo	1
	<i>Moxostoma poecilurum</i>	Blacktail redhorse	31
Centrarchidae	<i>Ambloplites macrochirus</i>	Shadow bass	1
	<i>Lepomis gulosus</i>	Warmouth	2
	<i>Lepomis humilis</i>	Orangespotted sunfish	9
	<i>Lepomis macrochirus</i>	Bluegill	293
	<i>Lepomis megalotis</i>	Longear sunfish	297
	<i>Lepomis microlophus</i>	Redear sunfish	8
	<i>Micropterus punctatus</i>	Spotted bass	95
	<i>Micropterus salmoides</i>	Largemouth bass	82
	<i>Pomoxis annularis</i>	White crappie	10
	<i>Pomoxis nigromaculatus</i>	Black crappie	9
Clupeidae	<i>Brevoortia patronus</i>	Gulf menhaden	4
	<i>Alosa chrysochloris</i>	Skipjack herring	4
	<i>Dorosoma cepedianum</i>	Gizzard shad	121
	<i>Dorosoma petenense</i>	Threadfin shad	78
Cyprinidae	<i>Ctenopharyngodon idella</i>	Grass carp	1
	<i>Cyprinella venusta</i>	Blacktail shiner	5,004
	<i>Cyprinus carpio</i>	Common carp	2
	<i>Hybognathus nuchalis</i>	Silvery minnow	4,601
	<i>Luxilus chrysocephalus</i>	Striped shiner	22
	<i>Macrhybopsis aestivalis</i>	Speckled chub	19
	<i>Lythrurus roseipinnis</i>	Cherryfin shiner	4
	<i>Notropis atherinoides</i>	Emerald shiner	409
	<i>Notropis longirostris</i>	Longnose shiner	121
	<i>Notropis texanus</i>	Weed shiner	851

	<i>Notropis volucellus</i>	Mimic shiner	384
	<i>Notropis winchelli</i>	Clear chub	92
	<i>Opsopoeodus emiliae</i>	Pugnose minnow	14
	<i>Pimephales vigilax</i>	Bullhead minnow	523
Fundulidae	<i>Fundulus notatus</i>	Blackstripe topminnow	27
Ictaluridae	<i>Ictalurus furcatus</i>	Blue catfish	50
	<i>Ictalurus punctatus</i>	Channel catfish	2,272
	<i>Noturus leptacanthus</i>	Speckled madtom	5
	<i>Noturus miurus</i>	Brindled madtom	2
	<i>Pylodictis olivaris</i>	Flathead catfish	46
Lepisosteidae	<i>Atractosteus spatula</i>	Alligator gar	1
	<i>Lepisosteus oculatus</i>	Spotted gar	16
	<i>Lepisosteus osseus</i>	Longnose gar	13
Moronidae	<i>Morone</i>	Hybrid striped bass	3
Mugilidae	<i>Mugil cephalus</i>	Striped mullet	17
Percidae	<i>Ammocrypta asprella</i>	Crystal darter	4
	<i>Ammocrypta beani</i>	Naked sand darter	47
	<i>Etheostoma histrio</i>	Harlequin darter	2
	<i>Etheostoma stigmaeum</i>	Speckled darter	6
	<i>Percina nigrofasciata</i>	Blackbanded darter	19
	<i>Percina sciera</i>	Dusky darter	24
	<i>Percina suttkusi</i>	Gulf logperch	6
Poeciliidae	<i>Gambusia affinis</i>	Western mosquitofish	13
Polyodontidae	<i>Polyodon spathula</i>	Paddlefish, Spoonbill	1
Sciaenidae	<i>Aplodinotus grunniens</i>	Freshwater drum	18
TOTAL # OF INDIVIDUALS			15,834
SPECIES RICHNESS			61

Table 2. Shannon-Weiner H', number of individuals (n) per site and species richness per site for samples collected during the PRFK post-incident monitoring from 2012-2014 in the Pearl River basin

	2012	2013	2014
NUMBER OF INDIVIDUALS (n) PER SITE	712.42	915	567.85
SPECIES RICHNESS PER SITE	22.42	22.85	19.57
SHANNON WIENER H'	1.6390	1.7319	1.6235

Mussel Assemblage Sampling

Sixteen samples were collected at eight different sites on the West Pearl River and the Bogue Chitto River annually between 2012 and 2014. Each site was sampled twice. One sample was conducted in the littoral zone in waters less than one meter in depth. Another sample was taken in waters greater than one meter. Sixteen combined samples for all years yielded a total of 7,002 individuals and a species richness of 26 (Table 3). The six most common

species sampled were *Quadrula refulgens* (27%), *Glebula rotundata* (21%), *Quadrula apiculata* (20%), *Quadrula quadrula* (11%), *Obliquaria reflexa* (6%) and *Potamilus purpuratus* (4%). These species represented 89% of the total collected (Figure 5). Mussel assemblages conducted pre-PRFK and post-PRFK produced similar results for CPUE per site, species richness per site and Shannon-Wiener H' per site (Table 4).

Table 3. Total number of mussels by species relative abundance and species richness for all 16 combined samples collected in < 1 meter and > 1 meter after the PRFK from 2012-2014 in the Pearl River basin.

SPECIES	TOTAL #	RELATIVE ABUNDANCE
<i>Quadrula refulgens</i>	1,863	0.2661
<i>Glebula rotundata</i>	1,486	0.2122
<i>Quadrula apiculata</i>	1,433	0.2047
<i>Quadrula quadrula</i>	802	0.1145
<i>Obliquaria reflexa</i>	413	0.0590
<i>Potamilus purpuratus</i>	298	0.0426
<i>Lampsilis teres</i>	236	0.0337
<i>Pyganodon grandis</i>	81	0.0116
<i>Plectomerus dombeyanus</i>	77	0.0110
<i>Villosa lienosa</i>	75	0.0107
<i>Leptodea fragilis</i>	58	0.0083
<i>Fusconaia flava</i>	37	0.0053
<i>Anodonta suborbiculata</i>	30	0.0043
<i>Toxolasmus Parvus</i>	20	0.0029
<i>Lampsilis ornata</i>	16	0.0023
<i>Tritogonia verrucosa</i>	13	0.0019
<i>Amblema plicata</i>	12	0.0017
<i>Ligumia subrostrata</i>	12	0.0017
<i>Arcidens confragosus</i>	9	0.0013
<i>Elliptio crassidens</i>	7	0.0010
<i>Lampsilis claibornensis</i>	7	0.0010
<i>Utterbackia imbecilis</i>	7	0.0010
<i>Villosa vibex</i>	5	0.0007
<i>Fusconaia ebena</i>	2	0.0003
<i>Truncilla donaciformis</i>	2	0.0003
<i>Toxolasmus texasensis</i>	1	0.0001
TOTAL # OF INDIVIDUALS	7,002	
SPECIES RICHNESS	26	

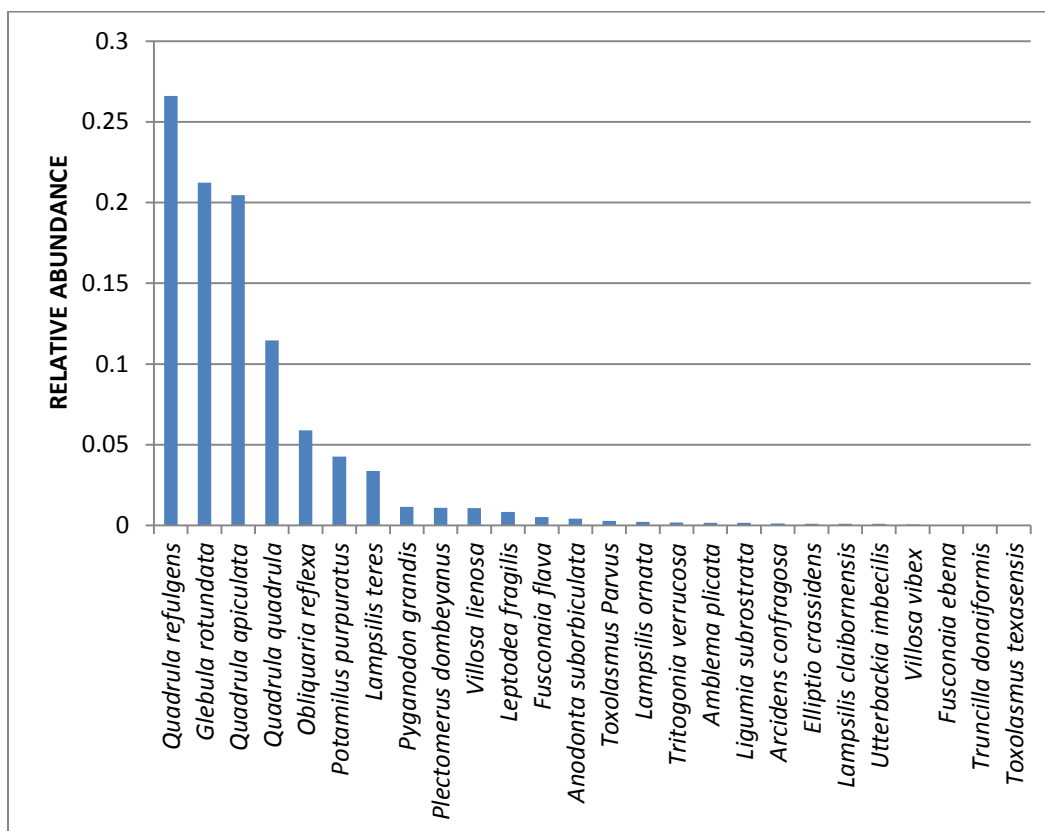


Figure 5. Relative abundance of freshwater mussels sampled between 2012 and 2014 in the Pearl River Basin (n = 7,002).

Table 4. Comparison of species richness, Shannon-Weiner H' diversity and CPUE among surveys conducted pre and post kill in the Pearl River basin. Only samples taken at one meter or less in depth were compared.

	PRE KILL 2007	DURING KILL 2011	POST KILL 2012	POST KILL 2013	POST KILL 2014
NUMBER PER SITE	221.4	171	235.11	349.25	150.375
SPECIES RICHNESS PER SITE	10.1	10.3	11.7	13.5	11.6
SHANNON WIENER H' PER SITE	1.402	1.372	1.5065	1.5063	1.4067

Bogue Lusa Creek Fish Assemblage

Fish Assemblage Sampling

In preparation for the proposed Washington Parish Reservoir samples were performed to establish a baseline data set for fish communities on the Bogue Lusa creek. Two hundred and ninety two individual fish were collected in 2014 in six 100 meter backpack electrofishing samples (Table 5). These samples represent species richness of 27 and a Shannon-Weiner H' per sample of 2.2481. *Percina nigrofasciata* (blackbanded darter) was the most common

species in these samples in aggregate. Eight hundred and ten individual fish were collected in 2015 in eight 100 meter backpack electrofishing samples (Table 5). These samples represent species richness of 33 and a Shannon-Weiner H' per sample of 2.4544. *Percina nigrofasciata* (blackbanded darter) was the most common species in these samples in aggregate (Figure 6).

Table 5. Fish species list, total number of individuals, species richness and Shannon-Wiener H' per site for samples collected in Bogue Lusa Creek in 2014 and 2015.

SPECIES	TOTAL 2014	TOTAL 2015
Black Banded Darter	38	104
Black Striped Topminnow	23	65
Blacktail Redhorse	1	4
Blacktail shiner	12	12
Bluegill	16	16
Bluehead Chub	14	14
Brindled Madtom	6	28
Cherryfin shiner	14	14
Chestnut Lamprey	1	9
Clear Chub	19	19
Creek Chub		22
Dollar Sunfish	2	1
Dusky Darter	20	85
Freckled Madtom	3	23
Gambusia	2	2
Grass Pickerel		4
Green Sunfish	6	12
Gulf Darter	5	11
Harlequin Darter		3
Longear	24	71
Longnose Shiner	10	22
Naked Sand Darter		1
Northern Hogsucker		3
Pirate Perch		10
Red Spotted Sunfish	3	16
Shadow Bass	1	19
Southern Striped Shiner	17	94
Southern Brook Lamprey	21	31
Speckled Darter	10	39
Speckled Madtom	14	36
Spotted Bass		7
Warmouth	8	11
Western Creek Chubsucker	2	2
TOTAL INDIVIDUALS	292	810

TOTAL INDIVIDUALS PER SAMPLE	48.66	101.25
SPECIES RICHNESS	27	33
SPECIES RICHNESS PER SAMPLE	13	17.5
SHANNON WEINER H' PER SAMPLE	2.2481	2.4544

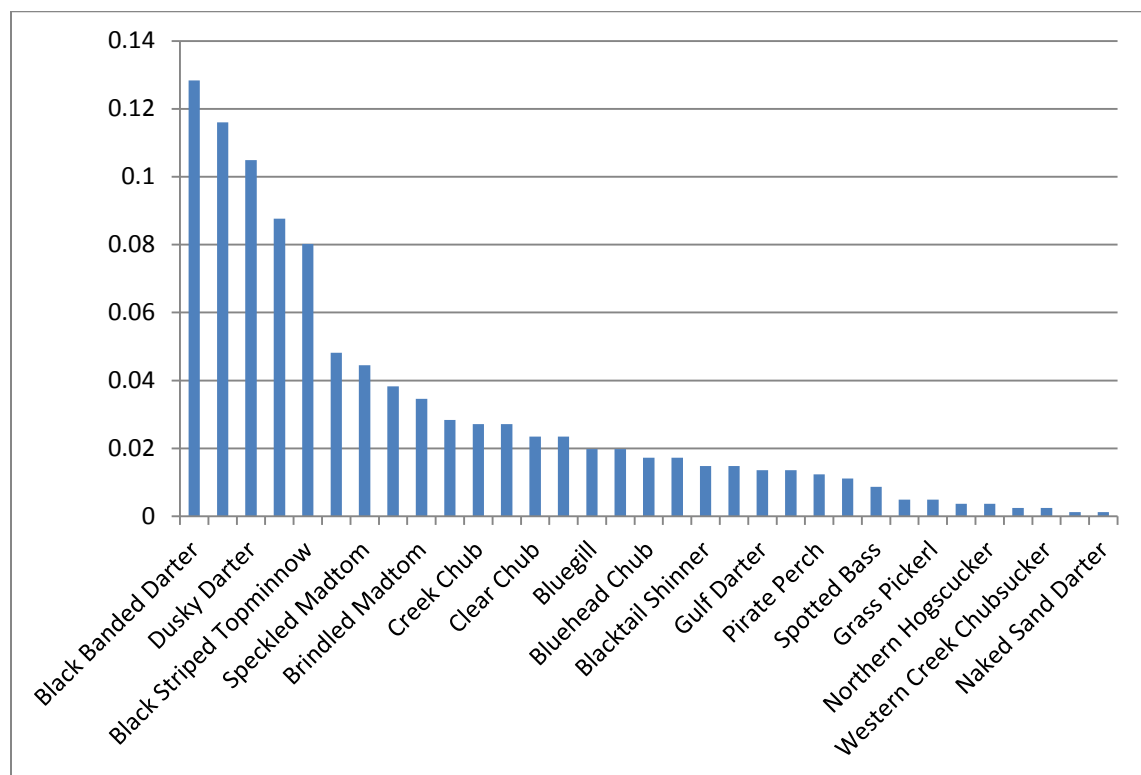


Figure 6. Relative composition of fish sampled in the Bogue Lusa creek in 2015 (n = 810).

Pearl River Navigation Canal (PRNC) between lock #1 and lock #2

Four samples were conducted in the semi-impounded 10.77 mile portion of PRNC between lock #1 and lock #2 to assess fishery community structure, abundance and condition.

Largemouth Bass

Electrofishing has proven to be the most effective method for collecting warmwater freshwater fishes and is used to evaluate LMB relative abundance (i.e., CPUE) and size distribution. Standardized electrofishing samples were collected in the PRNC between lock #1 and lock #2 from four sites in the summer of 2014.

Largemouth bass relative abundance, size distribution and relative weight

The length distributions for LMB collected in the summer of 2014 are presented in Figure 7. The mean sample catch per hour was 58. The LMB ranged from 1 to 13 inches total length (TL). Mean relative weight (Wr) of LMB sampled ranged from 81.024 grams to 227.7 grams and is in the acceptable range (i.e., above 80). Largemouth bass mean relative weights below 80 may indicate a potential problem with forage availability.

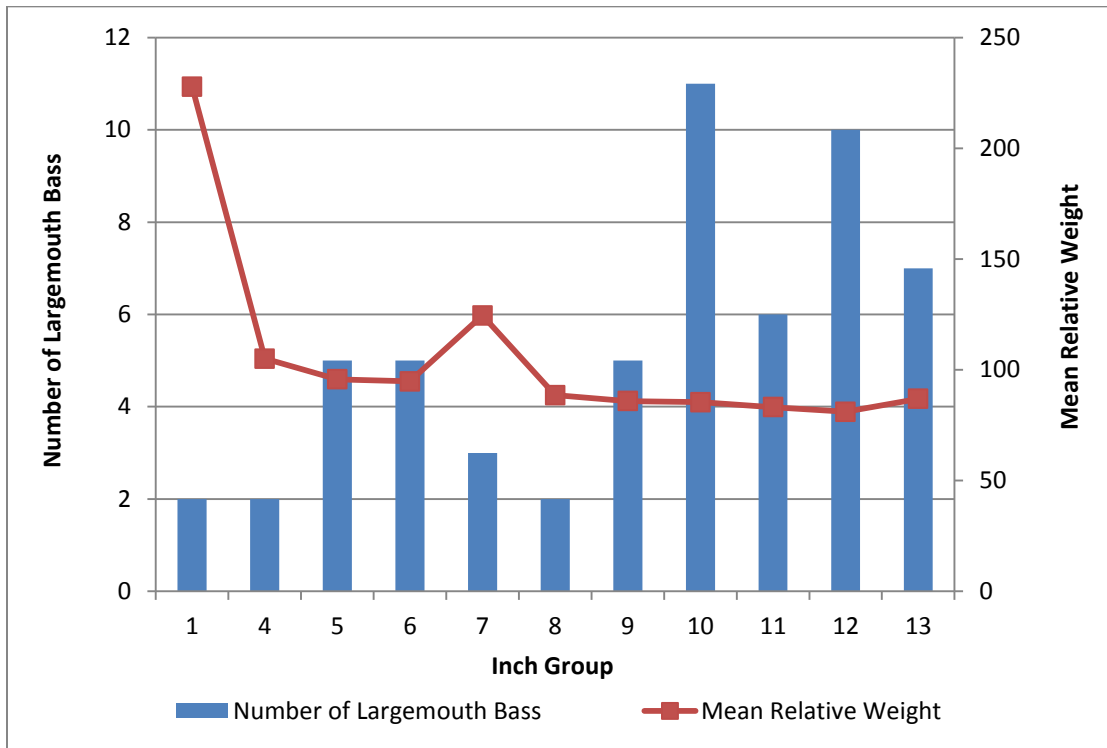


Figure 7. Size distribution by inch group and Wr of LMB collected from the PRNC between lock #1 and lock #2 in the summer of 2014.

Fish Assemblage Sampling

One hundred, fifty five individual fish were collected in four 900 second electrofishing samples, which were performed to establish a baseline data set for fish community on the PRNC (Table 6). These samples represent a species richness of 20. Largemouth bass was the most abundant species in these samples in aggregate (Figure 8).

Table 6. Fish species list, total number of individuals and species richness for samples conducted on PRNC in 2014.

SPECIES	TOTAL #	Relative Abundance
Largemouth Bass	58	0.3742
Bluegill	17	0.1097
Black Crappie	9	0.0581
Redear Sunfish	9	0.0581
Spotted Sucker	9	0.0581
Gizzard Shad	8	0.0516
Chain Pickerel	7	0.0452
Spotted Bass	6	0.0387
Lake Chubsucker	6	0.0387
Spotted Gar	6	0.0387
Blacktail Redhorse	5	0.0323

Grass Pickerel	3	0.0194
Longear Sunfish	3	0.0194
Channel Catfish	2	0.0129
Gulf logperch	2	0.0129
Warmouth	1	0.0065
Clear Chub	1	0.0065
Taillight Shiner	1	0.0065
Blackstripe Topminnow	1	0.0065
Brook Silverside	1	0.0065
TOTAL # OF INDIVIDUALS	155	
SPECIES RICHNESS	20	

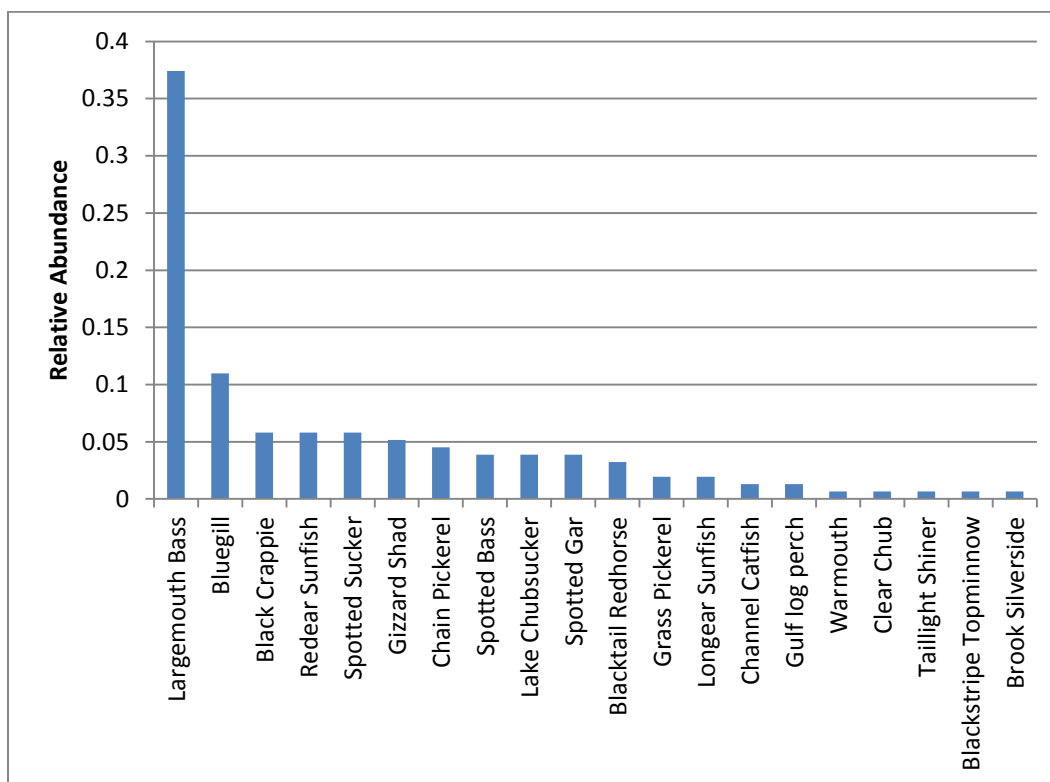


Figure 8. The relative abundance of fish collected from the PRNC between lock #1 and lock #2 in the summer of 2014.

Water Quality

Water quality worsened from lock #2 to lock #1 ([APPENDIX I](#); Figure 2). Low pH and dissolved oxygen was observed at sample site PRNC1 and PRNC2, both of which are closest to lock #1 (Table 7).

Table 7. Water quality parameters for samples conducted on PRNC in 2014.

STATION	WATER TEMPERATURE (c)	CONDUCTIVITY (mS/cm)	SALINITY (ppt)	PH (pH)	TURBIDITY (NTU)	DISSOLVED OXYGEN (mg/l)
PRNC1	25.06	0.049	0.02	5.84	8.9	2.85
PRNC2	27.62	0.053	0.02	6.02	8.3	3.5
PRNC3	25.9	0.059	0.03	6.54	14.3	6.28
PRNC4	24.96	0.064	0.03	6.7	21.4	5.78

Commercial

The PRB supports a small commercial fishery for catfishes and alligator gar (*Atractosteus spatula*).

Species of Special Concern

The PRB is home to the highest concentration of aquatic species of conservation concern in Louisiana (LDWF 2005). A complete listing can be found in the Pearl River MP-A. Anthropogenic activities within the floodplain have been attributed to the decline of many of these species. Of particular note, the Pearl darter (*Percina aurora*) is now considered extirpated from the river in both LA and MS (Ross (2001). Furthermore, recent surveys in LA have been unable to document the presence of the inflated heelsplitter mussel (*Potamilus inflatus*) or Alabama shad (*Alosa alabamiae*). In LA, the Gulf sturgeon (*Acipenser oxyrinchus desotoi*) can be found in the Pearl and Pontchartrain Basins. It is listed as Threatened by USFWS and has been protected in LA since 1991. Dr. Ken Sulak with USGS has provided a post Hurricane Katrina population estimate for Gulf sturgeon in the PRB. He estimated approximately 100-200 individuals based on over 15 years of data collected by LDWF and USFWS. In August of 2011, 28 Gulf sturgeons were found dead as the result of a point source pollution fish kill in the Pearl River.

HABITAT EVALUATION

Aquatic Vegetation

LDWF has not conducted a formal survey of aquatic vegetation in the PRB. Although slowly declining, aquatic species diversity within the PRB is high relative to all rivers in the state. This is indicative a productive system with complex habitats for a wide variety of species. Common salvinia (*Salvinia minima*) and water hyacinth (*Eichhornia crassipes*) are the primary nuisance plants in the system. The plants accumulate in back water areas and oxbows. The current Pearl River Aquatic Vegetation Management Plan (AVMP) estimates approximately 450 acres of common salvinia and 300 acres of water hyacinth throughout the system.

Substrate

Variable proportions of sand, silt, clay, small to medium gravel, and accumulated woody debris occur in all streams of the basin.

Artificial Structure

Small boat docks or piers and rip rap protected shorelines are sparsely located throughout the basin.

CONDITION IMBALANCE / PROBLEM

Low head dams on the Pearl and Bogue Chitto rivers limit the movement of fishes and the distribution of mussels within the basin. The dams are also suspected of altering the spawning migration of Gulf sturgeon and Alabama shad, two anadromous species. These dams also restrict boating access and exist as a threat to boater safety.

The 2004 Water Quality Inventory Report (LDEQ 2009) indicated that 78% of the 23 waterbody sub-segments in the PRB were not supporting their designated use for fish and wildlife propagation. The suspected causes for these water quality problems include: metals, nutrients, fecal coliform bacteria, organic enrichment and low concentrations of dissolved oxygen. Fish consumption advisories for mercury are in effect for the Pearl and Bogue Chitto Rivers in Louisiana.

The headwater dam (Ross Barnett Reservoir) at Jackson, MS has changed normal flow patterns in the lower Pearl Basin. Proposed reservoirs south of Jackson could compound the interruption of normal flow patterns in portions (LDWF 2005).

CORRECTIVE ACTION NEEDED

1. The Pearl and Bogue Chitto River sills should be removed to restore historic fish passage and migration routes, allow movement of potamodromous fish species, and restore boater access
2. A safer means of waste disposal for the Bogalusa Paper Mill should be investigated
3. Proposals for projects that could alter the hydrology of the PRB should be closely scrutinized

RECOMMENDATIONS

1. Coordinate with applicable government agencies and non-governmental organizations to develop a comprehensive management strategy for the Pearl River Basin
2. Continue treating nuisance vegetation with herbicide applications in accordance with the LDWF Aquatic Herbicide Application Procedures
3. Continue standardized fish and freshwater mussel population sampling that incorporates both species centric and assemblage analysis
 - a. Develop guidelines to ensure that sampling efforts are standardized with regard to water flow rates
 - b. Investigate sampling methods to increase the precision of catch rate indices and measurements of species abundance
 - c. Develop and implement protocol for sampling fisheries habitat parameters
4. Continue the use of existing recreational harvest regulations until LDWF sampling results indicate that change is necessary from a biological perspective or such time as a change in management strategy is indicated by the collective opinion of area anglers

Literature Cited

- LDWF 2005. Louisiana Comprehensive Wildlife Conservation Strategy. Louisiana Department of Wildlife and Fisheries. Baton Rouge. 455 pp.
- Ross, Stephen T., et al. 2001. Inland Fishes of Mississippi. Mississippi Department of Wildlife, Fisheries and Parks.

APPENDIX I

[\(return to document\)](#)

Figure 1. Electrofishing stations for the Middle Pearl River and West Middle Pearl River, Louisiana (waterbody code 090207)

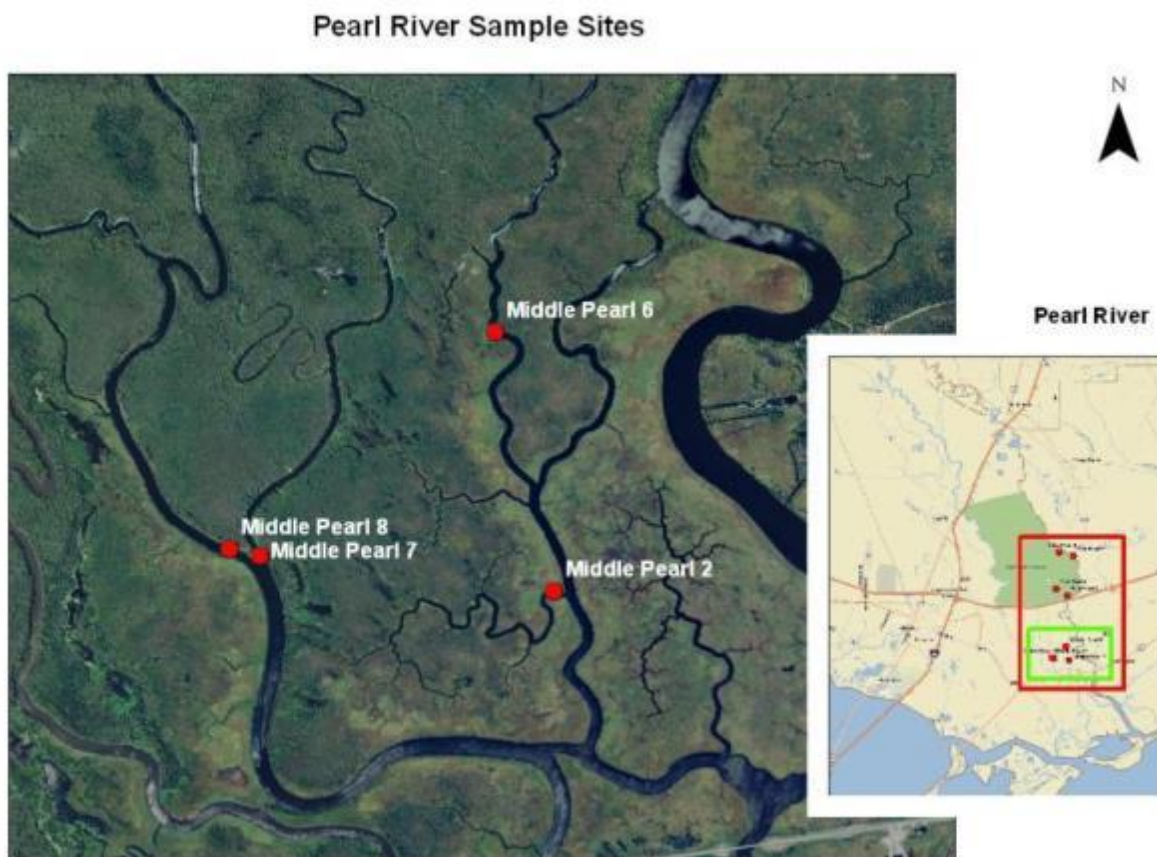
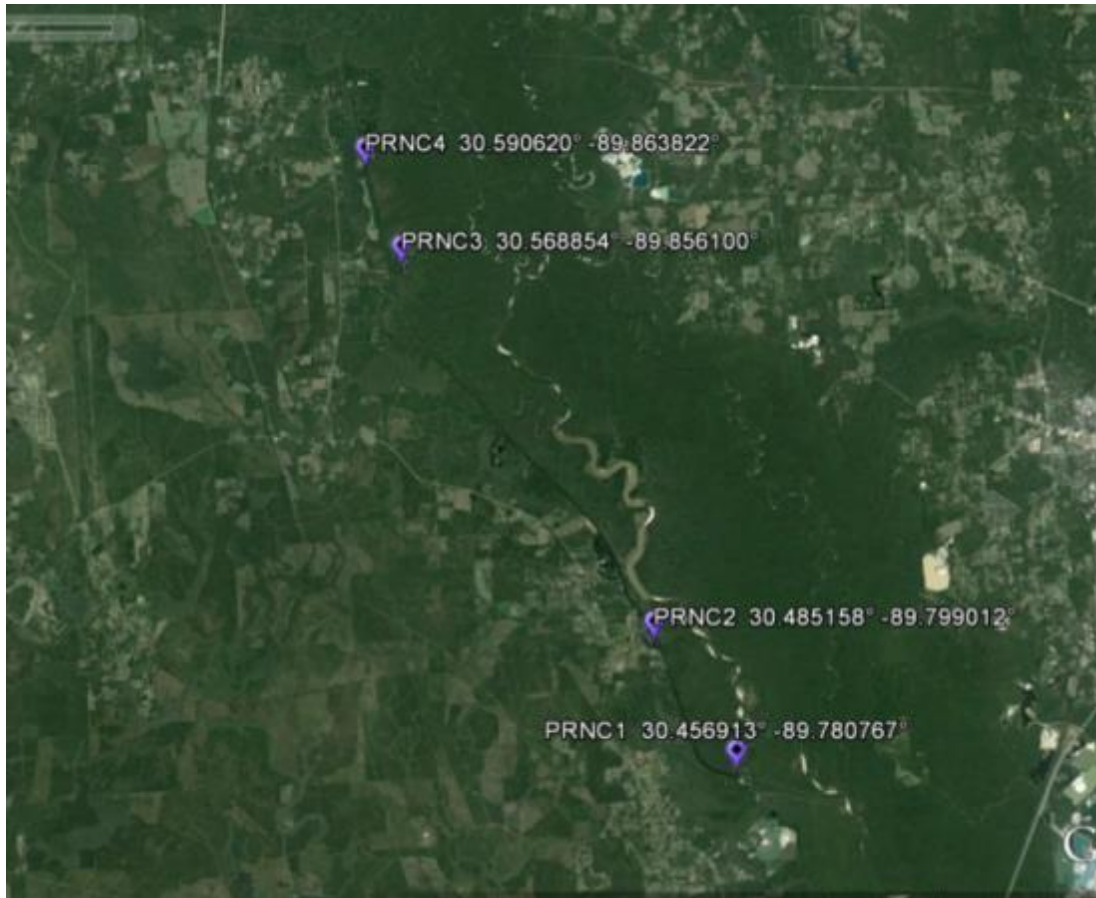


Figure 2. Electrofishing stations for the PRNC sampled in 2014.
([return to waterquality](#))



LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES



OFFICE OF FISHERIES
INLAND FISHERIES SECTION
DISTRICT VIII
Pearl River Fish Kill Post Incident
Monitoring Report 2014

The Louisiana Department of Wildlife and Fisheries (LDWF) completed the third year of a 3 year fish and mussel monitoring project in the Pearl River and associated waters. The project's primary objective is to monitor the recovery of native species following the August 2011 Temple-Inland kill and to identify management actions that may be necessary for a return to pre-incident conditions.

Fish population sampling

Fish population sampling for this monitoring effort will comply with LDWF standardized sampling procedures. Additional sampling will be conducted in tributaries with slight variations of sampling gear to ensure that all representative habitats are sampled. Sampling will be conducted in the normal low flow months of late summer and early fall. Seven stations have been selected for fish sampling in the Pearl River watershed (Table 1). Five of those stations are within the portion of the river that was impacted by the spill. One sampling station is located upstream from the spill impacted area. Three stations have been selected for fish samples in tributaries (Table 1).

Each main stem river station and the Bogue Chitto River tributary station will be sampled using the following gear types and techniques. For each gear listed below all fish will be collected and identified to species. Common species will be sorted to inch group. Individual lengths and weights will be recorded for rare species and species of concern (Table 2).

- 1.) **Boat Electrofishing**: 900 second samples, randomly chosen shoreline within 500 meters (m) of station GPS location, conducted in downstream manner while speed not exceeding the river flow rate, 3/16 mesh dip net
- 2.) **Hoopnets**: Four feet (ft.) hoops, 1.5" mesh, 15ft in length, #15 tarred twine, 2 throats, no lead, no bait, three nets per station, set for 72 hours
- 3.) **Seines**: Standard 25 ft. X 6 ft. X 3/16" mesh with 6 ft. bag, 2 hauls per site, after dark when possible

Each tributary station will be sampled after dark with either a 10 ft. X 6 ft. X 3/16" mesh seine or a 20 ft. X 6 ft. X 3/16" mesh seine. Seine hauls will be made within 100 m of the established station GPS location. All fish collected will be identified to species. Common species will be sorted to inch group. Individual lengths and weights will be recorded for rare species and species of concern (Table 2).

Table 1. Pearl River Fish Monitoring Stations

Site	Latitude	Longitude	Main River Sample	Tributary Sample
PRFK 1	30.78555	-89.81933	X	
PRFK 2	30.72111	-89.84086	X	
PRFK 3	30.61188	-89.82227	X	
PRFK 4	30.52452	-89.80802	X	
PRFK 5	30.47272	-89.77833	X	
PRFK 6	30.37611	-89.73036	X	
BogueChitto1	30.62330	-89.87627	X	
Pushepatapa Creek	30.86508	-89.81302		X

Bogalusa Creek	30.76961	-89.89144		X
Cryer Slough	30.53905	-89.82763		X

Table 2. Pearl Basin Freshwater Fish Species of Concern (LDWF 2005)

Common Name	Scientific Name
Gulf sturgeon	<i>Acipenser oxyrinchus</i>
Paddlefish	<i>Polyodon spathula</i>
Alabama shad	<i>Alosa alabamae</i>
Flagfin shiner	<i>Pteronotropis signipinnis</i>
Bluenose shiner	<i>Pteronotropis welaka</i>
Longjaw minnow	<i>Ericymba amplamala</i>
River Redhorse	<i>Moxostoma carinatum</i>
Southeastern Blue sucker	<i>Cycleptus meridionalis</i>
Frecklebelly madtom	<i>Noturus minutus</i>
Crystal darter	<i>Crystallaria asprella</i>
Channel darter	<i>Percina copelandi</i>
Freckled darter	<i>Percina lenticula</i>
Pearl darter	<i>Percina aurora</i>
Gulf logperch	<i>Percina suttkusi</i>

Freshwater Mussel Sampling

Mussel population sampling for this effort will be consistent with a protocol previously established by Louisiana State University (Brown et al. 2010) - see detailed sampling protocol below. Sampling will be conducted annually from late summer to early fall to coincide with the normal period of low flow. A total of eight stations have been selected for monitoring (Table3). Six of these stations were sampled in 2007, three of which were sampled again in 2011 (Table 3). These stations are within the area impacted by the Temple-Inland kill from Bogalusa to the Interstate-59 overpass. Two additional sites were selected in areas of the river that were not impacted by the Temple-Inland kill. One of those is located upstream from the affected area. The other is located in the Bogue Chitto River, downstream of the low head sill.

The majority of dead mussels observed during the Temple-Inland kill were the same species, *Leptodea fragilis*. This species and other thin-shelled mussels have a low relative abundance in comparison to other mussel species found in the Pearl River (Miller, A.C. and Payne 1997). In 2007, thin-shelled species accounted for only 4.32 percent of mussels sampled (Brown et al. 2010).

Additional samples at all sites in depths >1 meter will be collected in an effort to expand the understanding of mussel habitat and species community composition. Additional sampling will be conducted if the threatened inflated heelsplitter (*Potamilus inflatus*) or other species of conservation concern are encountered (Table 4). In addition, the location, photographs, and measurements of total shell length will be recorded for each these mussels observed during sampling.

Analysis of these data will include: mortality (% of the individuals collected dead), catch per unit effort (total number of mussels collected per site in 90 minutes), species richness, and Shannon-Wiener Diversity Index (H').

Sampling Protocol

Timed qualitative searches, consistent with protocol conducted by Louisiana State University (Brown et al. 2010) before and after the Temple-Inland kill will be performed at each established sample site. A ninety person-minute sample will be conducted at each site where biologists will work along the littoral zones (<1 m depth) locating mussels by tactile search, retrieving both living mussels and shell. All collected mussels will be identified to species level. Additional samples will be conducted in water >1 m depth adjacent to samples taken in the littoral zone et al. sites. Biologists will utilize SCUBA equipment for these samples. At each site, water quality parameters will be collected, which include water temperature, conductivity, salinity, turbidity, P.H. and dissolved oxygen.

Table 3. Freshwater Mussel Monitoring Sites

Site	Latitude	Longitude	2007	2011	New	>1 m depth
111	30.39830	-89.72236	X	X		X
113	30.47441	-89.77951	X	X		X
114	30.42955	-89.73927	X	X		X
123	30.51872	-89.80377	X			X
130	30.60380	-89.82227	X			X
143	30.72508	-89.83950	X			X
150	30.78305	-89.82730			X	X
BC	30.6224	-89.87725			X	X

Table 4. Mussel Species of Conservation Concern (LDWF 2005).

Common Name	Scientific Name
Rayed Creekshell	<i>Anodontoidea radzatus</i>
Elephant-Ear	<i>Elliptio crassidens</i>
Mississippi Pigtoe	<i>Pleurobema beadleianum</i>
Inflated Heelsplitter	<i>Potamilus inflatus</i>
Southern Rainbow	<i>Villosa vibex</i>

Results:

Fish Population Sampling

Four thousand, eighty nine individual fish representing forty species from fourteen families were collected (Table 3). Members of the family Cyprinidae were most abundant in the samples. Ten species of Cyprinidae accounted for 82% of the total individuals collected. Two species of Cyprinidae dominated: Blacktail shiner and Silvery minnow alone accounted for 75% of the total individuals collected. Members of the family Ictaluridae (catfishes) were second most abundant in the samples comprising 6.2% of the total collected, followed by members of the family Centrarchidae with 5.5% of the total collected.

Table 3. PRFK Post Incident Monitoring 2012-2014 Fish Species List

FAMILY	SCIENTIFIC NAME	COMMON NAME	TOTAL COUNT
Achiridae	<i>Trinectes maculatus</i>	Hogchoker	38
Atherinopsidae	<i>Labidesthes sicculus</i>	Brook silverside	1
Catostomidae	<i>Carpiodes carpio</i>	River carpsucker	6
	<i>Cycleptus elongates</i>	Blue sucker	1
	<i>Hypentelium nigricans</i>	Northern hogsucker	2
	<i>Ictiobus bubalus</i>	Smallmouth buffalo	11
	<i>Moxostoma poecilurum</i>	Blacktail redhorse	4
Centrarchidae	<i>Ambloplites macrochirus</i>	Shadow bass	1
	<i>Lepomis macrochirus</i>	Bluegill	80
	<i>Lepomis megalotis</i>	Longear sunfish	68
	<i>Lepomis microlophus</i>	Redear sunfish	1
	<i>Micropterus punctatus</i>	Spotted bass	30
	<i>Micropterus salmoides</i>	Largemouth bass	38
	<i>Pomoxis annularis</i>	White crappie	4
	<i>Pomoxis nigromaculatus</i>	Black crappie	1
Clupeidae	<i>Alosa chrysochloris</i>	Skipjack herring	2
	<i>Dorosoma cepedianum</i>	Gizzard shad	62
	<i>Dorosoma petenense</i>	Threadfin shad	65
Cyprinidae	<i>Ctenopharyngodon idella</i>	Grass carp	1
	<i>Cyprinella venusta</i>	Blacktail shiner	1515
	<i>Hybognathus nuchalis</i>	Silvery minnow	1553
	<i>Luxilus chrysocephalus</i>	Striped shiner	9
	<i>Notropis atherinoides</i>	Emerald shiner	48
	<i>Notropis longirostris</i>	Longnose shiner	56
	<i>Notropis texanus</i>	Weed shiner	2
	<i>Notropis volucellus</i>	Mimic shiner	71
	<i>Notropis winchelli</i>	Clear chub	21
	<i>Pimephales vigilax</i>	Bullhead minnow	93
Fundulidae	<i>Fundulus notatus</i>	Blackstripe topminnow	3
Ictaluridae	<i>Ictalurus furcatus</i>	Blue catfish	16
	<i>Ictalurus punctatus</i>	Channel catfish	219
	<i>Noturus leptacanthus</i>	Speckled madtom	2
	<i>Noturus miurus</i>	Brindled madtom	2
	<i>Pylodictis olivaris</i>	Flathead catfish	13
Lepisosteidae	<i>Lepisosteus oculatus</i>	Spotted gar	4
Moronidae	<i>Morone</i>	Hybrid striped bass	1
Mugilidae	<i>Mugil cephalus</i>	Striped mullet	5

Percidae	<i>Ammocrypta asprella</i>	Crystal darter	2
	<i>Ammocrypta beani</i>	Naked sand darter	14
	<i>Etheostoma stigmaeum</i>	Speckled darter	3
	<i>Percina nigrofasciata</i>	Blackbanded darter	8
	<i>Percina sciera</i>	Dusky darter	5
	<i>Percina suttkusi</i>	Gulf logperch	4
Poeciliidae	<i>Gambusia affinis</i>	Western mosquitofish	1
Sciaenidae	<i>Aplodinotus grunniens</i>	Freshwater drum	3
TOTAL			4,089

Mussel Population Sampling

Diversity and species richness

Sixteen total samples were taken at eight different sites on the West Pearl River and the Bogue Chitto River. Eight samples at one meter and less yielded a result of: 1203 total individuals, a species richness of 20 and a Shannon-Wiener H' value of 2.012764272 (Table 4). Eight samples at greater than one meter yielded a result of 886 individuals, a species richness of 16 and a Shannon-Wiener H' value of 1.811957628 (Table 5). Sixteen combined samples yielded a result of 2089 individuals, a species richness of 20 and a Shannon-Wiener H' value of 2.001181217 (Table 6). The six most common species sampled were *Quadrula refulgens* at 30%, *Quadrula apiculata* at 24%, *Glebula rotundata* at 14%, *Quadrula quadrula* at 12%, *Obliquaria reflexa* at 6% and *Potamilus purpuratus* at 4%. These species represent 89% of the total collected (Chart 1).

Mussel Species of Conservation Concern

No *Potamilus inflatus* were found.

Mussel Mortality

Lampsilis teres displayed the highest percentage of mortality at a 61.9% mortality rate (Table 7).

Table 4.

Mussels sampled at 8 different sites at < 1 Meter

SPECIES	NUMBER OF INDIVIDUALS	RELATIVE ABUNDANCE
<i>Quadrula refulgens</i>	300	0.249376559
<i>Glebula rotundata</i>	261	0.216957606
<i>Quadrula apiculata</i>	212	0.176226101
<i>Quadrula quadrula</i>	197	0.163757273

Obliquaria reflexa	63	0.052369077
Potamilus purpuratus	46	0.038237739
Lampsilis teres	40	0.033250208
Fusconaia flava	18	0.014962594
Pyganodon grandis	17	0.014131338
Anodonta suborbiculata	11	0.009143807
Plectomerus dombeyanus	9	0.007481297
Leptodea fragilis	8	0.006650042
Villosa lienosa	5	0.004156276
Amblema plicata	4	0.003325021
Lampsilis ornata	3	0.002493766
Toxolasmus Parvus	3	0.002493766
Tritogonia verrucosa	3	0.002493766
Arcidens confragosus	1	0.000831255
Ligumia subrostrata	1	0.000831255
Utterbackia imbecilis	1	0.000831255
Total # of Individuals	1203	1
Species Richness	20	
H'	2.012764272	

Table 5.

Mussels sampled at 8 different Site AT > 1 Meter

SPECIES	NUMBER OF INDIVIDUALS	RELATIVE ABUNDANCE
Quadrula refulgens	322	0.363431151
Quadrula apiculata	283	0.319413093
Obliquaria reflexa	52	0.058690745
Potamilus purpuratus	48	0.054176072
Quadrula quadrula	46	0.051918736
Glebula rotundata	38	0.042889391
Plectomerus dombeyanus	24	0.027088036

Villosa lienosa	17	0.019187359
Lampsilis teres	13	0.014672686
Toxolasmus Parvus	11	0.01241535
Pyganodon grandis	9	0.010158014
Leptodea fragilis	8	0.009029345
Fusconaia flava	7	0.007900677
Anodonta suborbiculata	6	0.006772009
Lampsilis ornata	1	0.001128668
Ligumia subrostrata	1	0.001128668
TOTAL # OF INDIVIDUALS	886	
SPECIES RICHNESS	16	

Table 6.

Mussels sampled from a total of 16 samples < >1 Meter

SPECIES	NUMBER OF INDIVIDUALS	RELATIVE ABUNDANCE
Quadrula refulgens	622	0.29775012
Quadrula apiculata	495	0.236955481
Glebula rotundata	299	0.143130685
Quadrula quadrula	243	0.1163236
Obliquaria reflexa	115	0.055050263
Potamilus purpuratus	94	0.044997607
Lampsilis teres	53	0.025370991
Plectomerus dombeyanus	33	0.015797032
Pyganodon grandis	26	0.012446146
Fusconaia flava	25	0.011967449
Villosa lienosa	22	0.010531355
Anodonta suborbiculata	17	0.008137865
Leptodea fragilis	16	0.007659167
Toxolasmus Parvus	14	0.006701771
Amblema plicata	4	0.001914792
Lampsilis ornata	4	0.001914792
Tritogonia verrucosa	3	0.001436094
Ligumia subrostrata	2	0.000957396
Arcidens confragosa	1	0.000478698
Utterbackia imbecilis	1	0.000478698

TOTAL # OF INDIVIDUALS	2089	1
SPECIES RICHNESS	20	
SHANNON-WIENER	2.001181217	

Chart 1.

Relative Abundance

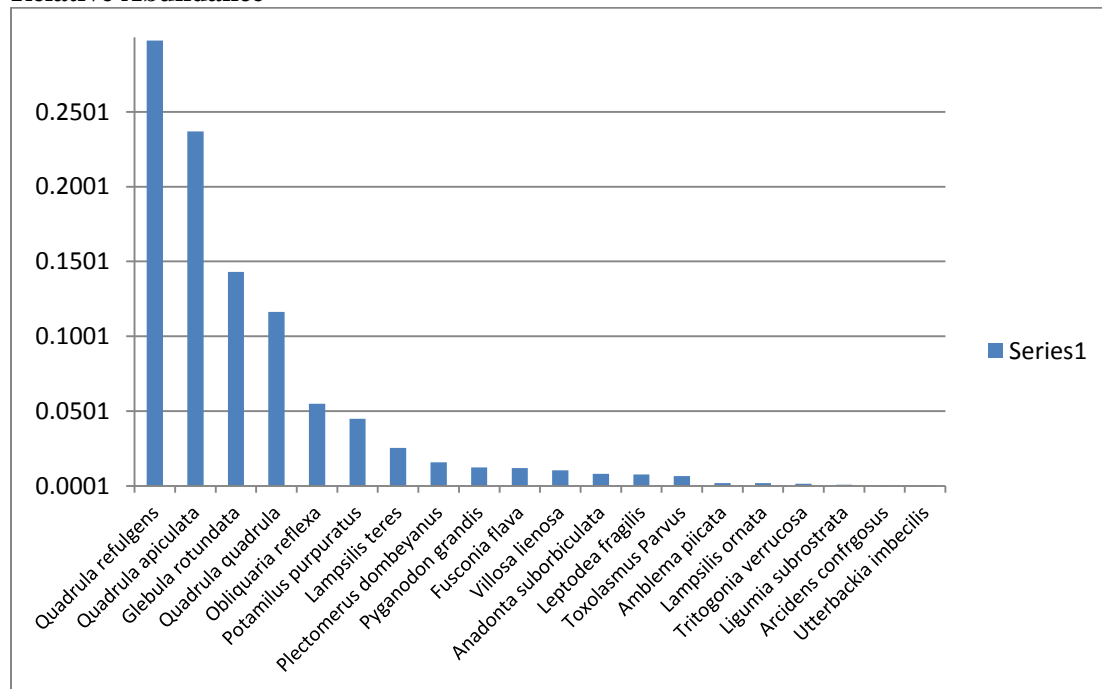


Table 7.

Mussel Mortality

Species	Total % mortality per species
Lampsilis teres	61.90%
Lampsilis ornata	34.15%
Leptodea fragilis	11.11%
Glebula rotundata	10.53%
Toxolasma parva	7.14%
Potamilus purpuratus	6.15%
Villosa lienosa	5.88%
Obliquaria reflexa	4.92%
Fusconia flava	4.10%
Plectomerus dombeyanus	2.86%

Quadrula apiculata	2.29%
Pyganodon grandis	2.26%
Quadrula refulgens	1.85%
Quadrula quadrula	0.58%
Ligumia subrostrata	0.00%
Uttebackia imbecilis	0.00%
Andodonta suborbiculata	0.00%
Amblema plicata	0.00%
Arcidens confragosus	0.00%
Fusconaia ebena	0.00%
Lampsilis claibornensis	0.00%
Toxolasma texasensis	0.00%
Tritogonia verrucosa	0.00%
Uniomerus tetralasmus	0.00%